

MAILED 10 JAN 31 2002
DATE CANCELLED

SEQUENCE LISTING



5

<110> Novozymes A/S

Jorgensen, Steen T

Rasmussen, Michael D

Andersen, Jens Tonne

Olsen, Carsten

<120> Multiple Insertion of Genes

<130> 10022.204-US

<140> 09/928847

<141> 2001-08-13

<160> 50

<170> PatentIn version 3.1

<210> 1

<211> 30

<212> DNA

<213> Artificial Sequence

<220>

<223> Primer

<400> 1

gactaagctt ctgcatagtg agagaagacg

30

<210> 2

<211> 67

<212> DNA

<213> Artificial Sequence

<220>

<223> Primer

<400> 2

gactgaattc agatctgcgg ccgcacgcgt gtcgacagta ctgaaataga ggaaaaaata 60

agtttttc 67

<210> 3

<211> 33

<212> DNA

<213> Artificial Sequence

<220>

<223> Primer

<400> 3

gactgaattc cgtatccatt cctgcgatat gag 33

<210> 4

<211> 41

<212> DNA

<213> Artificial Sequence

<220>

<223> Primer

<400> 4

gactggatcc agatcttatt acaaccctga tgaatttgtc g 41

<210> 5

<211> 60

<212> DNA

<213> Artificial Sequence

<220>

<223> Primer

<400> 5

gactggatcc agatctgcta gcatcgatcc gcggctatatt ccattgaaag cgattaattg 60

<210> 6

<211> 31

<212> DNA

<213> Artificial Sequence

<220>

<223> Primer

<400> 6

tatttcccga gattctgtta tcgactcgct c

31

<210> 7

<211> 27

<212> DNA

<213> Artificial Sequence

<220>

<223> Primer

<400> 7

gttttcggcc gctgtccggt cgtcttt

27

<210> 8

<211> 27

<212> DNA

<213> Artificial Sequence

<220>

<223> Primer

<400> 8

gtgtgacgga taaggccgcc gtcattg

27

<210> 9

<211> 28

<212> DNA

<213> Artificial Sequence

<220>

<223> Primer

<400> 9

ctcttgctc ggagcctgca ttttgggg

28

<210> 10

<211> 26

<212> DNA

<213> Artificial Sequence

<220>

<223> Primer

<400> 10

agcattattc ttcgaagtcg cattgg

26

<210> 11

<211> 45

<212> DNA

<213> Artificial Sequence

<220>

<223> Primer

<400> 11

ttaagatctt tttatacaa ataggcttaa caataaagta aatcc

45

<210> 12

<211> 3342

<212> DNA

<213> Bacillus licheniformis

<220>

<221> CDS

<222> (1303)..(2469)

<223>

<220>

<221> misc_feature

<222> (2685)..(2685)

<223> n denotes an undetermined nucleotide

<400> 12

```
gcgtaccggt aaagtcgaac agcgggtttct tccttttttac atccatggat taaaaagggg    60
ttgaaaaaag gtgagaaaaa gctttgtttt gcttttaacg gggctgcatg taatccttat    120
gctttctgcc tgcggccaaa aatcgaaga agatgttggtg acggggctcg acaagaaggc    180
aaaagaatac acgtcctata aggcaaaagc gaaaatgacc attgaaacgg ggaatgaccc    240
gcaggagtac aacgtggaaa tctggcataa aaaaccttct ctttaccggg tctatttgga    300
aaacccgaaa aaagaccaga gccagggtgat cttgcgcaat gaaaacggcg tgtttgTTTT    360
gactccgtcg ctgaataaaa gcttccgctt tcacagcgac tggcccaata acagcagcca    420
gggtatactta ttcgaatcgc tcgtaaagga tgtcaaaaat gatggggaag cttctttttc    480
cgcaaaggat tcaaaataca tttttgaaac gaaaacgaat tatcagcata atcagatgct    540
gccgactcag gaaatcgttt tccataaaaa gaccatggct cttcatcgg ttaaagtgat    600
ggataccgac cgcaaaccga tggtaaaggt tgagtttaca agctttgaat tcgataagcc    660
gctcgataaa gactcttttg atgaaaagaa aaatatgacg ctgtctcaaa ttgacgtagc    720
gacaagcgct gacgtgtcag actctttcgc tgtcaaaacg ccgctcgatg tgcctcaggg    780
cgtgaaaaag cttgaagaga aagagatggc gactgaagac ggcaaacgga tcgtcatcac    840
atatggcggg gaaaaatcct ttacattgat tcaggaaaaa gcccgcgtcg ccaaaacatc    900
cacttccgta tccatgaacg gagagcccgt tgacctcggc ttcacggtcg gcgcactgac    960
ggataaatcg ttgtcatgga catatgacgg agtcgattac tttatctcat cagaagatct   1020
ttctcaagat gaacttctga tggttgcaaa aagcatgcag ggacagtctt cgaaatagac   1080
tgtgccgtat ccggcagcct gttttccgcc cggaagcgga aagcaggctt ttttatattt   1140
gcgtcgcaag cgtatgattt cgacagcttt tccgtaaaat gtataccgtg ccagcaattt   1200
ttcttttggt cagggctgat gatcccgtgc aaaatttccc tttctccgaa ctttttagta   1260
tgatgggaag gacgagtga acaaggaaca ggaagtgtca tg atg agc tta aaa   1314
                               Met Ser Leu Lys
                               1

cca ttc tat aga aag aca tgg gcc gaa atc gat tta acg gct tta aaa   1362
Pro Phe Tyr Arg Lys Thr Trp Ala Glu Ile Asp Leu Thr Ala Leu Lys
5          10          15          20

gaa aac gtc cgc aat atg aag cgg cac atc ggc gag cat gtc cgc ctg   1410
-5-
```

Glu	Asn	Val	Arg	Asn 25	Met	Lys	Arg	His	Ile 30	Gly	Glu	His	Val	Arg 35	Leu	
atg Met	gcc Ala	gtc Val	gtt Val 40	aaa Lys	gcg Ala	aat Asn	gcc Ala	tac Tyr 45	gga Gly	cac His	ggg Gly	gat Asp	gca Ala 50	cag Gln	gta Val	1458
gcg Ala	aag Lys	gcg Ala 55	gct Ala	ctt Leu	gca Ala	gaa Glu	ggg Gly 60	gcg Ala	tcc Ser	att Ile	ctt Leu	gct Ala 65	gtg Val	gct Ala	tta Leu	1506
ttg Leu	gat Asp 70	gaa Glu	gcg Ala	ctt Leu	tcg Ser	ctg Leu 75	agg Arg	gcg Ala	cag Gln	ggg Gly	att Ile 80	gaa Glu	gaa Glu	ccg Pro	att Ile	1554
ctt Leu 85	gtc Val	ctc Leu	ggt Gly	gca Ala	gtg Val 90	ccg Pro	acc Thr	gaa Glu	tat Tyr	gca Ala 95	agc Ser	att Ile	gcc Ala	gcg Ala	gaa Glu 100	1602
aag Lys	cgc Arg	att Ile	atc Ile	gtg Val 105	act Thr	ggc Gly	tac Tyr	tcc Ser	gtc Val 110	ggc Gly	tgg Trp	ctg Leu	aaa Lys	gac Asp 115	gtg Val	1650
ctc Leu	ggt Gly	ttt Phe	ctg Leu 120	aat Asn	gag Glu	gcc Ala	gaa Glu	gct Ala 125	cct Pro	ctt Leu	gaa Glu	tat Tyr	cat His 130	ttg Leu	aag Lys	1698
atc Ile	gac Asp	acg Thr 135	ggc Gly	atg Met	ggc Gly	cgc Arg	ctt Leu 140	ggc Gly	tgc Cys	aaa Lys	acg Thr	gaa Glu 145	gaa Glu	gag Glu	atc Ile	1746
aaa Lys	gaa Glu 150	atg Met	atg Met	gag Glu	atg Met	acc Thr 155	gaa Glu	tcg Ser	aac Asn	gat Asp	aag Lys 160	ctc Leu	aat Asn	tgt Cys	acg Thr	1794
ggc Gly 165	gtg Val	ttc Phe	act Thr	cat His	ttc Phe 170	gcc Ala	acg Thr	gcg Ala	gac Asp	gaa Glu 175	aag Lys	gac Asp	acc Thr	gat Asp	tat Tyr 180	1842
ttc Phe	aac Asn	atg Met	cat His	ctt Leu 185	gac Asp	cgc Arg	ttt Phe	aaa Lys	gag Glu 190	ctg Leu	atc Ile	agc Ser	ccc Pro	ttc Phe 195	ccg Pro	1890
ctt Leu	gac Asp	cg Arg	ttg Leu 200	atg Met	gtg Val	cat His	tcg Ser	tca Ser 205	aac Asn	agc Ser	gcc Ala	gcg Ala	ggt Gly 210	ctg Leu	cg Arg	1938
ttc Phe	agg Arg	gaa Glu 215	cag Gln	cta Leu	ttt Phe	aat Asn	gcc Ala 220	gtc Val	cg Arg	ttc Phe	ggc Gly	atc Ile 225	ggc Gly	atg Met	tac Tyr	1986
ggt Gly	ttg Leu 230	gcg Ala	ccg Pro	tca Ser	acc Thr	gaa Glu 235	ata Ile	aaa Lys	gac Asp	gag Glu	ctg Leu 240	ccg Pro	ttt Phe	cg Arg	ctg Leu	2034
cg Arg 245	gaa Glu	gtg Val	ttt Phe	tcg Ser	ctt Leu 250	cat His	acc Thr	gaa Glu	ctc Leu	acc Thr 255	cat His	gtg Val	aaa Lys	aaa Lys	att Ile 260	2082
aaa Lys	aaa Lys	ggc Gly	gag Glu	agc Ser 265	gtc Val	agc Ser	tac Tyr	ggg Gly 270	gcg Ala	aca Thr	tat Tyr	aca Thr	gct Ala	cag Gln 275	cg Arg	2130
gac	gaa	tgg	atc	ggg	aca	gtc	ccc	gtc	ggg	tat	gcc	gac	gga	tgg	ctg	2178

Asp Glu Trp Ile Gly Thr Val Pro Val Gly Tyr Ala Asp Gly Trp Leu	
280 285 290	
agg cgc ctg gcc gga acg gaa gtg ctg atc gac gga aaa cgc caa aaa	2226
Arg Arg Leu Ala Gly Thr Glu Val Leu Ile Asp Gly Lys Arg Gln Lys	
295 300 305	
ata gca ggg aga atc tgc atg gac cag ttc atg att tcc ctt gcc gaa	2274
Ile Ala Gly Arg Ile Cys Met Asp Gln Phe Met Ile Ser Leu Ala Glu	
310 315 320	
gaa tac cct gtc ggc aca aag gtt acc ttg atc gga aag caa aaa gac	2322
Glu Tyr Pro Val Gly Thr Lys Val Thr Leu Ile Gly Lys Gln Lys Asp	
325 330 335 340	
gaa tgg atc tca gtc gac gaa atc gcc caa aat ttg cag acg atc aat	2370
Glu Trp Ile Ser Val Asp Glu Ile Ala Gln Asn Leu Gln Thr Ile Asn	
345 350 355	
tat gaa att acc tgt atg ata agt tca agg gtg ccc cgt atg ttt ttg	2418
Tyr Glu Ile Thr Cys Met Ile Ser Ser Arg Val Pro Arg Met Phe Leu	
360 365 370	
gaa aat ggg agt ata atg gaa ata agg aat ccg atc ttg cct gat caa	2466
Glu Asn Gly Ser Ile Met Glu Ile Arg Asn Pro Ile Leu Pro Asp Gln	
375 380 385	
tcc tgaaaattga tgaattagcg gaaaaacaac tttgcttgcg aaaagaataa	2519
Ser	
tgatatgatt atgaatggaa tggatagagt gttgtatccg taagtttggt ggaggtgtat	2579
gtttttgtct gaatccagcg caacaactga aatattgatt cgcttgccag aagcttttagt	2639
atcagaactg gatggtgtcg tcatgcgaga taaccgggag cagganatga actgatttta	2699
ccaagccaca aaaatgtagg aacgcgaacg caaaaaatcg acaaattcgg ggaatcgatg	2759
agaagcgggtt atatggagat ggccaagatc caatttgaac atctcttctg aggctcaatt	2819
tgcagagtat gaggctgaaa acacagtaga gcgcttacta agcggatgat aatcatttga	2879
ttgttaaacg cggcgatggt tatttttgctg acctatctcc tgttggtggc tcagaacaag	2939
gcggggtgcg cccggtttta gtgattcaaa acaacatcgg caatcgcttc agcccaactg	2999
ctattgttgc agccataaca gccc aaatac agaaagcaaa attacctacc cacgtcgaaa	3059
ttgatgcgaa acgctacggt ttgaaagag actccgttat attgctcgaa caaattcggg	3119
cgattgacaa gcaaagatta acggacaaaa tcacccatct cgatgatgaa atgatggaaa	3179
aggatcaacga agccttacaa atcagtttgg cactcattga tttttaatat tgatgaaagt	3239
tgctcgaggc gaaagagcaa ctttttttgt gttcaaaaat aacaatacga tataatggta	3299
actgttagtc ctaaaaatgt tagccagatg tagtcagggg gat	3342

<210> 13

<211> 389

<212> PRT

<213> Bacillus licheniformis

<220>

<221> misc_feature

<222> (2685)..(2685)

<223> n denotes an undetermined nucleotide

<400> 13

Met Ser Leu Lys Pro Phe Tyr Arg Lys Thr Trp Ala Glu Ile Asp Leu
1 5 10 15

Thr Ala Leu Lys Glu Asn Val Arg Asn Met Lys Arg His Ile Gly Glu
20 25 30

His Val Arg Leu Met Ala Val Val Lys Ala Asn Ala Tyr Gly His Gly
35 40 45

Asp Ala Gln Val Ala Lys Ala Ala Leu Ala Glu Gly Ala Ser Ile Leu
50 55 60

Ala Val Ala Leu Leu Asp Glu Ala Leu Ser Leu Arg Ala Gln Gly Ile
65 70 75 80

Glu Glu Pro Ile Leu Val Leu Gly Ala Val Pro Thr Glu Tyr Ala Ser
85 90 95

Ile Ala Ala Glu Lys Arg Ile Ile Val Thr Gly Tyr Ser Val Gly Trp
100 105 110

Leu Lys Asp Val Leu Gly Phe Leu Asn Glu Ala Glu Ala Pro Leu Glu
115 120 125

Tyr His Leu Lys Ile Asp Thr Gly Met Gly Arg Leu Gly Cys Lys Thr
130 135 140

Glu Glu Glu Ile Lys Glu Met Met Glu Met Thr Glu Ser Asn Asp Lys
145 150 155 160

Leu Asn Cys Thr Gly Val Phe Thr His Phe Ala Thr Ala Asp Glu Lys
165 170 175

Asp Thr Asp Tyr Phe Asn Met His Leu Asp Arg Phe Lys Glu Leu Ile
180 185 190

Ser Pro Phe Pro Leu Asp Arg Leu Met Val His Ser Ser Asn Ser Ala
195 200 205

Ala Gly Leu Arg Phe Arg Glu Gln Leu Phe Asn Ala Val Arg Phe Gly
210 215 220

Ile Gly Met Tyr Gly Leu Ala Pro Ser Thr Glu Ile Lys Asp Glu Leu
225 230 235 240

Pro Phe Arg Leu Arg Glu Val Phe Ser Leu His Thr Glu Leu Thr His
245 250 255

Val Lys Lys Ile Lys Lys Gly Glu Ser Val Ser Tyr Gly Ala Thr Tyr
260 265 270

Thr Ala Gln Arg Asp Glu Trp Ile Gly Thr Val Pro Val Gly Tyr Ala
275 280 285

Asp Gly Trp Leu Arg Arg Leu Ala Gly Thr Glu Val Leu Ile Asp Gly
290 295 300

Lys Arg Gln Lys Ile Ala Gly Arg Ile Cys Met Asp Gln Phe Met Ile
305 310 315 320

Ser Leu Ala Glu Glu Tyr Pro Val Gly Thr Lys Val Thr Leu Ile Gly
325 330 335

Lys Gln Lys Asp Glu Trp Ile Ser Val Asp Glu Ile Ala Gln Asn Leu
340 345 350

Gln Thr Ile Asn Tyr Glu Ile Thr Cys Met Ile Ser Ser Arg Val Pro
355 360 365

Arg Met Phe Leu Glu Asn Gly Ser Ile Met Glu Ile Arg Asn Pro Ile
370 375 380

Leu Pro Asp Gln Ser
385

<210> 14

<211> 20

<212> DNA

<213> Artificial Sequence

<220>

<223> Primer
<400> 14
gatgaacttc tgatggttgc 20

<210> 15
<211> 26
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer
<400> 15
aaaggatccc cctgactaca tctggc 26

<210> 16
<211> 39
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer
<400> 16
aaagcggccg cgagactgtg acggatgaat tgaaaaagc 39

<210> 17
<211> 32
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer
<400> 17
aaagaattcg tgaaatcagc tggactaaaa gg 32

<210> 18
<211> 32

<212> DNA
 <213> Artificial Sequence

 <220>
 <223> Primer
 <400> 18
 aaaggatccc gcaagcaaag ttgtttttcc gc 32

 <210> 19
 <211> 30
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> Primer
 <400> 19
 aaagggtaccg aaagacatgg gccgaaatcg 30

 <210> 20
 <211> 32
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> Primer
 <400> 20
 aaagggtaccg gtaatgactc tctagcttga gg 32

 <210> 21
 <211> 33
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> Primer

<400> 21
 caaatcgatc atcaccgaaa cgcggcaggc agc 33

<210> 22
 <211> 31
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Primer

<400> 22
 attaagcttg atatgattat gaatggaatg g 31

<210> 23
 <211> 30
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Primer

<400> 23
 aaagctagca tccccctgac tacatctggc 30

<210> 24
 <211> 24
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Primer

<400> 24
 gcgtaccgtt aaagtcgaac agcg 24

<210> 25
 <211> 30
 <212> DNA

<213> Artificial Sequence

<220>

<223> Primer

<400> 25

aaagctagca tccccctgac tacatctggc

30

<210> 26

<211> 5761

<212> DNA

<213> *Bacillus licheniformis*

<400> 26

accggggccg ggcgttttgt cggcaacgtc tgtatatattc agccttgaaa ggcccttgat	60
tccttcatgg atgatcgctt tcataaaaaa attcccccca ttcgagttgg ttgtgttaaa	120
ttatggacat gaatgaaggt aaatgtaaaa tgatttgccc ggggccgctt agaggccttc	180
tgttttataa aggattgcaa tgaggcggaa attccattag tgtaatacag aagcaagcta	240
gcaagtgaag gagatggaac atgagttttc acgatcaaaa tattttacct gcggtacgca	300
atatgaagca gttcgataca ttcctggaca gccctttttc atacggggtg ctgcttgaca	360
tccatcttgg acagctggga ggcgtgatca gcgcggcaag atcccatggg aaaaaaatgt	420
ttgttcacgt cgatctgac caaggaatta agcatgatga atacggtgcg gaattcattt	480
gccaggaaat gaaaccggcg ggcattcttt ctacgagatc aagcgttatc gccaaagcaa	540
agcagaagaa agtgtatgcy atccagcgca tgtttttaaat agacacaagc gccatgaaga	600
agagcattga attggtgaaa aagcacagac ccgactatat agaagtgctt cccggagtag	660
tgccggaatt gatcagggaa gtcaaagaaa taaccggcat tccgatcttt gcgggcgggt	720
ttatccgtac cgaaaaagac gtcgagcagg cgcttgcagc aggggcgtcc gcagtcacca	780
cctcagacac tgatttatgg aaaaaatact ggaactaaaa atttaaaatg tgaaaaatta	840
ttgacaacgc tttcactata cgatacgatc ttactaagtt aatacattgt gacggagacc	900
cggagaccac agcagttctt tactcagtat gatgtaaaga aagtttgctg tgttttttta	960
tggtctttta gacacagtgg agaaggtgaa cttatggcgt tcatctatta gaataatact	1020
tcataataga ttttaggagg gatagccttg acagcatttt ggggggaagt tatcggaacg	1080
atgctgctca tcgtctttgg agctggagtt tgtgcaggag ttaatttgaa aaaatcgctg	1140
tcccatcaat ccggatggat tgtgatcgtc ttcggctggg ggcttggcgt ggccatggcg	1200
gtatatgccg tcggcggcat cagcggagcg catttaaatc cggccgttac attggggctg	1260

gcatttgtcg	gagattttcc	ttgggaagaa	gtgccttcat	atattttggg	acagatgatc	1320
ggcgcatttt	taggagcggg	gctcgttttt	cttcactact	tgccgcactg	gaaagaaacc	1380
gaggatcaag	gcgcgaagct	tggagtattt	tcgacagggtc	cggcgattcc	aaatacattt	1440
gcaaacctgt	tcagtgaaac	attggggact	tttattctcg	ttctcggact	tttaacgatc	1500
ggtgcaaaca	agtttactga	cggactgaat	cctcttggtg	tcggatttct	gatcgtggcg	1560
atcggtatct	cgctcggcgg	aacaacaggc	tatgcgatta	accctgcccc	cgatctgggg	1620
ccgagaattg	cccattttgt	ccttccgatt	gcaggcaaag	ggagttcaaa	ctggaagtac	1680
gcgtggatcc	ctgttttagg	accggcgctt	ggcggttcat	ttgcaggcgt	tttttacaac	1740
gccgtattca	aagggcatat	cacaaacaca	ttttggattg	taagcgttat	actagttgtg	1800
atattgttag	gtttctatat	tcatatgaaa	aaacaagcag	ttgatcaatc	ggtcaacatt	1860
taaaaaaaaag	caatcttaac	agacatataa	gggggagttt	caaatggaa	aagtacattt	1920
tgtctcttga	tcaaggcacc	acaagcacia	gggcgattgt	tttcaacaaa	gcaggcgaaa	1980
tcgtccatat	tgcgcaaaaag	gaattccagc	aatattttcc	aaaccccggc	tgggttgaac	2040
acaatgcaaa	cgaaatctgg	ggctctgttc	tgtcgggtgat	cgcttcagcg	ctttcagaat	2100
cggggatcga	agccggacaa	attgccggaa	tcgggatcac	aaaccagcgg	gaaacgaccg	2160
tggtttggga	taaacatacc	ggcaaaccgg	tctacaacgc	gattgtgtgg	cagtcccgcc	2220
aatcggctga	gatatgccag	gaattaaaag	agaaaggcta	tgaagagacg	atcagagaaa	2280
aaacagggct	tttaatcgat	ccttattttt	caggcacgaa	agtgaaatgg	atcctggatc	2340
atgtggaagg	ggcaaggagg	aaagccgaaa	acggcgacct	tctcttcggt	acgatcgatt	2400
cttggtgat	ctggaaaatg	tccggcggaa	aagcgcattg	gacagattat	tcaaacgcct	2460
caagaacatt	gatgttcaac	atctatgacc	taaaatggga	tgatgaactt	ctcgatattc	2520
tcggcgtgcc	gaaatcgatg	gttccggaag	tcaagccttc	atcgcatgta	tacgctgaaa	2580
cggtcgatta	tcatttcttc	ggcaaaaaca	ttccgattgc	aggtgcagcc	ggcgaccagc	2640
aggcagcatt	gttcgggagc	gcttgctttg	aagaaggaaat	ggttaagaac	acgtatggaa	2700
caggctgctt	tatgctgatg	aacaccggcg	agaaagcgat	taaatcagag	cacggcctgc	2760
tgacgacaat	cgcttggggc	atcgacggaa	aggtggaata	tgcgctggaa	ggcagcgtct	2820
tcgtcgcggg	ttccgctatt	caatggctgc	gtgatgggct	gagaatgttt	aaagacgcca	2880
aagaaagtga	aaaatacgct	gtaagagcag	aatctgccga	tgggtgtttat	gtggtccctg	2940
catttgtagg	tttaggcacg	ccttattggg	acagcgatgt	ccgcggcgct	gtattcggac	3000
tgacccgggg	tacgacgaaa	gagcatttta	tcagagcaac	gcttgaagcg	cttgcctatc	3060
aaacgaaaga	cggtgctggac	gcaatgaagg	aagactccgg	gatcccgggt	aaaacgctga	3120
gagtcgacgg	cggagctgtc	aaaaacaact	tcctgatgga	ttttcagggc	gacatttttag	3180

atgtccctgt agaacgtcct gaaatcaatg aaacaacagc gcttggttca gcctatttag	3240
cgggccttgc tgtcggcttc tggagcgatc gttccgagat caaagaccag tggcagcttg	3300
acaaacgttt tgaaccgaaa atggaagaaa aagagcgtga gagcctgtac aacgggtgga	3360
agaaagctgt aaatgcagct agggctttta aataagctgc atgtatgtta caatctaatt	3420
aagttaatag aaacggtttg agaagaggag agaccgcaga caccaaagca gtatcagcgc	3480
tttgatgtt tgtggtctct ttttctattt ttaccgtga caacaaggga ggacatgaaa	3540
catggaatca ttattttcaa gccgtaaacg ggacgacatt ttacagaata tgacgaagca	3600
gaagtatgac gtgtttatta tcggcggagg tattactggg gctgggacgg cattggatgc	3660
cgcacgcgc ggaatgaaaa cggcgctttg cgaaatgcag gactttgcag ccggaacgtc	3720
aagccgttcc acgaaacttg tacacggcgg gcttcgctat ttaaagcaat ttgaagtga	3780
aatggtagcc gaggtcggca aagagcgggc gatcgtctat gaaaacgggc cgcacgttac	3840
aacgcccga tggatgctgc ttccgatgca taaggaggag actttcggca aattcagcac	3900
ttcaatcga ctgagggtgt acgacttttt ggcaggcgtc aaaaaagctg agcggaggag	3960
catgctgact gccgaagaaa cgcttcaaaa agagccgctc gtgaaaaaga acggcctgaa	4020
gggcggcggc tattatgtcg aataccggac ggatgatgcc agattgacga tcgaagtc	4080
gaaagaagcc gttaaattcg gagccgaggc cgtcaattat gcaaaagtaa gcgattttat	4140
atatgaaaac ggcaaggtca ccggcggtgt cattgaagac gtcttcacga aaaaaacgta	4200
ccgcgtctac gcgaaaaaaaa ttgtcaatgc cgcggggccg tgggtcgacc gtctgcggga	4260
aaaagaccat tcaaaagaag gcaaacacct tcagcataca aaaggcgtgc atcttgTTTT	4320
tgatcaatcg gtctttcctt taaaacaagc cgtttatttt gatacgctg acggccgcat	4380
ggtgttcgcc attccgagag acggaaaggc atatgtcggc acaacagaca ccgtctacaa	4440
cgagaatttg gaacaccctc gaatgacgac agcagacagg gattatgtca tcaatgcaat	4500
caactatatg ttccctgaac ttggaatcaa agccgaagat gtcgaatcaa gctgggctgg	4560
cctcagaccg ctgattcatg aagaaggaaa agaccgtcc gagattttcc gaaaagatga	4620
gatctggact tctgaatccg gactgatcac gatcgccggc ggaaagctga caggctacag	4680
aaaaatggct gagcatatcg tcgatcttgt cagagaccga ttaaaagaag agggcgacag	4740
agacttcggg ccttgacgaa caaaaacgat gccgatttca ggcggccata tcggcggtc	4800
caaaaatctg gaggctttta ttcaagcgaa agcagccgaa gggattgagg ccggactgtc	4860
cgaagagacg gccaaacaaa tcgccgcacg atacggttcg aacgcagacc gcctgtttga	4920
tcgtattcca tcgctgaaag atgaagcagc aaaacgccgc atccctgtcc atgtactagc	4980
agaaatggat tacgggatcg aggaagaaat ggcagccgtc ccggcagact tcttcgtccg	5040
cagaaccggt gcgctgttct ttgacatcaa ttgggtccgc acttacaag agagccttac	5100

ggactacatg agcgagaagc tgaactggga tggcgaaacg aaggcccggc atgtcaaggc 5160
 attggaagga ctactacacg atgctgttgt cccgctggaa agcaaagat ttattaggtc 5220
 aaataacctt ggtgaatttt cgtaataat caatcgaatg gcccggcgtg aggctgtcct 5280
 gaacaggcag cctcatTTTT ttcatttggc atgctaaatt tggacaaagc ggcggtttgt 5340
 cgatatgata aaagaaaagc tgcaattact tagctagaac attggaggta atcatgagct 5400
 ggagaacgag ctatgaacgc tggagaaaca aagaaaactt agattccgaa ttaaaagcgc 5460
 ttctttttgga agcgggaagga aatgaaaaag aactagagga ttgcttttat aaaaaacttg 5520
 agtttggtac agccggtatg cgcggtgaga tcggaccggg cccgaaccgc atgaacgttt 5580
 atacggttcg caaagcatcg gcgggccttg cgcatacat aggagcgaac ggcggcgaag 5640
 caaaaaagcg cggcggttgatg atcgcgtagc attcccgcca caaatcgctt gaatttgcaa 5700
 tggagactgc taagacgctc gcagaaaacg gcgttcaaac gtacgtgttt gagcgtaact 5760
 g 5761

<210> 27

<211> 34

<212> DNA

<213> Artificial Sequence

<220>

<223> Primer

<400> 27
 gactgaattc gcaatttgaa gtgaaaatgg tagc 34

<210> 28

<211> 33

<212> DNA

<213> Artificial Sequence

<220>

<223> Primer

<400> 28
 gactggatcc agatctcatc ttttcgggaa atc 33

<210> 29

<211> 56

<212> DNA

<213> Artificial Sequence

<220>

<223> Primer

<400> 29

gactgaattc agatctgcgg ccgcacgcgt agtactcccg gcgtgaggct gtcttg 56

<210> 30

<211> 32

<212> DNA

<213> Artificial Sequence

<220>

<223> Primer

<400> 30

gactaagctt cagttacgct caaacacgta cg 32

<210> 31

<211> 47

<212> DNA

<213> Artificial Sequence

<220>

<223> Primer

<400> 31

ccgagatttc ccgaaaagat gaaatttgga cttctgaatc cggactg 47

<210> 32

<211> 50

<212> DNA

<213> Artificial Sequence

<220>

<223> Primer

<400> 32
gactaagctt agatctgcta gcatcgattg attattaacg aaaattcacc 50

<210> 33

<211> 31

<212> DNA

<213> Artificial Sequence

<220>

<223> Primer

<400> 33
gactaagctt gtgaaggaga tggaacatga g 31

<210> 34

<211> 64

<212> DNA

<213> Artificial Sequence

<220>

<223> Primer

<400> 34
gactggatcc agatctgcgg ccgcacgcgt cgacagtact attttttagtt ccagtatttt 60
ttcc 64

<210> 35

<211> 32

<212> DNA

<213> Artificial Sequence

<220>

<223> Primer

<400> 35
gagctctaga tcttcggcgg catcagcgga gc 32

<210> 36

<211> 28
 <212> DNA
 <213> Artificial Sequence

<220>

<223> Primer

<400> 36
 gactgaattc cttttgcgca atatggac 28

<210> 37

<211> 58

<212> DNA

<213> Artificial Sequence

<220>

<223> Primer

<400> 37
 gagctctaga tctgctagca tcgatccgcg gttaaaatgt gaaaaattat tgacaacg 58

<210> 38

<211> 1500

<212> DNA

<213> Bacillus licheniformis

<400> 38
 atcagcgata gggctcgcat cgacagaccg gatttcatcc ggccaatggc gggatgacgg 60
 gctgggtcatc aggtcgacat ccggcgatca gtttaatgcc attgaccctg atctgggtcat 120
 tgacaaagac ggaaagccct ggctctcatt cggttccttc tggagcggca ttaagctgac 180
 aaggcttgat aaaaacacga tgaaaccgac ggggaagcctg tattcgatcg cctcaaggcc 240
 gaataacgga ggagcgggtg aagccccgaa cattacctac aaagacgggt actattactt 300
 atttgtctcg ttgacagct gctgcaaagg ggtggacagc acatataaaa tagcctatgg 360
 ccgttcaacg agcattacgg gaccctatta tgataaaagc ggcaaaaata tgatgaacgg 420
 cggagggacg atcctggact ccggcaatga ccgctggaaa gggccgggac atcaggatgt 480
 tctgaacaac tcgatccttg tcaggcatgc ttacgacgcg ctggacaatg gtgtatcaaa 540
 gctgctcatc aatgacttgt actgggattc ccaaggatgg ccgacttatt aacagcagat 600

gacggg	cggt	ttccg	cccg	tttttt	ttt	tgt	gaa	tct	gtca	aaaaaa	aata	aaaaaac	660
ataccg	gaaa	ttaa	attg	ac	ag	tttt	tttt	ata	atg	atat	aatg	aagttg	720
tatg	tttt	atg	tag	ttg	tac	gtac	ata	taat	cgc	gat	acag	tttgag	780
gatt	tatg	tt	tttt	gta	ag	cg	tttt	aata	gttt	gct	att	ctac	840
cgagg	aggag	gaag	ctatt	gatt	cagg	ca	aag	cgc	atg	tg	tttt	gggt	900
agcc	agcatt	tatat	ggcga	agagg	cggta	caag	aggtag	aag	agc	attc	caaa	atgatc	960
tgca	acggat	taa	atg	acg	agatt	taag	ttt	caag	tcg	agt	acaa	agc	1020
tcg	ctgg	acg	gcgt	cagaaa	actg	tttgaa	gagg	cga	acc	ggg	ac	gatga	1080
atcat	cacct	ggat	gcatac	gttt	taccg	gccaaa	atgt	ggatt	ccc	gg	cct	ttccgag	1140
ctga	ataagc	cgct	gctcca	tttt	catacc	cag	tttaacc	ggg	acattcc	gtg	ggg	ataaa	1200
atcg	acatgg	attt	catgaa	tatta	atcag	tctg	cccacg	gcg	accg	cga	atac	ggtttt	1260
atcg	gagcga	gatt	gggcat	tcct	cgaaaa	gta	atcgccg	gat	attg	gga	agac	agagaa	1320
gtaa	agcgct	cgat	cgacaa	atgg	atgagc	gcag	cggtcg	cat	atattga	agg	ccg	ccat	1380
atca	aagtcg	ccc	gatttgg	ggaca	acatg	cgga	atgtgg	cggt	aacaga	agg	agataag	1440	
attg	aagcgc	agatt	cagct	tgg	ctggtct	gtc	gacggat	atg	gaatcgg	cgat	ctcgtc	1500	

<210> 39

<211> 32

<212> DNA

<213> Artificial Sequence

<220>

<223> Primer

<400> 39

gactaagctt catccggcga tcagtttaat gc

32

<210> 40

<211> 65

<212> DNA

<213> Artificial Sequence

<220>

<223> Primer

<400> 40
gactgaattc agatctgCGG ccgcacgcgt cgacagtact attttttttt gacagatttc 60
agaac 65

<210> 41

<211> 37

<212> DNA

<213> Artificial Sequence

<220>

<223> Primer

<400> 41
gactggatcc agatctagtc gagtacaaag cggtggc 37

<210> 42

<211> 31

<212> DNA

<213> Artificial Sequence

<220>

<223> Primer

<400> 42
gactgaattc gaccagccaa gctgaatctg c 31

<210> 43

<211> 4078

<212> DNA

<213> Bacillus licheniformis

<400> 43
tttccggcgt agcaccCGaa gcgaacctat taatcgTcaa ggtgctcggc ggtgaagacg 60
gcagcgggga ttatgaatgg atcatcaacg ggatcaacta cgccgttgag caaaaagccg 120
acattatttc aatgtcgctc ggcggtcctg ccgacgttcc ggagttgaag gaagcgggtga 180
caaacgccgt gaagagcggga gtgctcgTcg tctgcgccgc aggaaacgaa ggcgacggca 240
atgaccgtac agaggagtac tcataccctg ctgcatacaa cgaagtcac gccgtcggat 300
ccgtgtcatt gacgcgtgag tcttccgaat tttcaaatgc gaacaaagaa attgaccttg 360

ttgcacctgg agaagaaatc ctctctacat tgccccacca tcaatacggg aagctgacgg	420
gaacatcgat ggctacaccg cacgtcagcg gcgcgctcgc tctcatcaag tcagctgaag	480
aagaggcggt taaacggaaa ctgacagaac ccgaactgta tgctcagtta atccgccgca	540
cccttcctct tgattactca aaagcgctga tcggcaacgg attcttatat ttgtcagcgc	600
cggaggtact ggcggaaaaa gccggcgaag caaaacttct ttccctttaa cagtctaaag	660
gaggctgccg acaatgtcgg cggccttttt catggccatg tataaagctg aatcttttta	720
attgcaagaa ttcaaaaatt attttgacta aaagatcgcg gcggtatata atctactaaa	780
caatttcacg gccgggaaca tggtaatcta acgaggttag attttaaaag ggaagtttgg	840
tgaaaatcca acgcggtccc gccactgtga atgaggaggt tatttcataa aaccactgt	900
ttctatatgg gaagggggaa ataaccgtcg attcatgagc caggagacct gcctgttctg	960
acgcaccata aacctacggt cgataggagg tggtcgagtt gacgtaacaa tcgctacgtt	1020
tatttctcgt tcgcaacatg ctgttttcag gcattcacct tctcattgtc cgaagtgtga	1080
gtgtcttttt ttattgaaca ctaaaaggag gagaccagac atgactaatg taaaaacgag	1140
cagcttgggc tttccaagaa tcggcttgaa cagagaatgg aaaaaatcgc ttgaggctta	1200
ttggaaagga aacacggacc gcgagacctt ttgaaagaa atggatgaac aatttttagc	1260
agcgtccag actcagcttg atcagcaaat cgatatcata ccggtttccg actttacaat	1320
gtacgaccat gttcttgaca cggcgggtgat gttcaactgg attccagatc gattcaagga	1380
tataaacgat ccgttagata cttatttcgc aatggcgaga ggcacgaaag atgctgtatc	1440
gagtgaatg acaaaatggt ttaatacaaa ctaccattat attgtgcctg aatatgaaaa	1500
aggtgcacaa taccgcgtga cgagaaacaa accgcttcaa gattaccaa gagcaaaagc	1560
agcattggga acagaaacga agcccgtcat actcggcctt tacactttcg tagcccttgc	1620
aaaaggctat gaacaacagg atattaaaga tatttataac caaatgacac ctctttacat	1680
ccagggtttg aaagagcttg agcaggaagg cgtcaaattg gtgcaaattg acgagcctgc	1740
tcttgtgacg gcttcacctg aagaagcggc tgctgtcaaa gaaatctatc agacgattac	1800
agaagaagtc tctgaactga acatccttct gcaaacctac ttgactcgg ttgatgctta	1860
tgaagagctg atatcgtttc ctgtcgcagg aattgggtctt gatattgttc atgataaagg	1920
gaaaaacttc gaacacctga aagcgcacgg ttttcctaaa gacaaagtcc ttgccgccgg	1980
catttttagac ggacgcaaca ttggaaagc caatctcgaa gagcgcctcg acctgacgct	2040
tgaactgacg cagagagcgg gtgttgacga agtctggatt cagccttcaa acagcctgct	2100
tcatgtccct gtcgcaaaac acccgggcga acatcttgcc gacgatctct tgaacggttt	2160
atctttcgca aaagagaaac ttctggagct tacactgctg aagaacggac ttgtttccgg	2220
aaaagcggcc atccaagcgg aaatcgatga agcgcacgga caccttcaag atctcaaaca	2280

gtacggtgca gcgacaaatt cggcctttgc cgaagaaaga ggcaagctga ctgaggaaga	2340
ctttaaacgc ccgacagctt ttgaagaaag gctgcggatt caaatgact ctctcggact	2400
tcccctattg ccgacaacaa cgatcggcag cttcccgcag acggcggatg tgcggagcgc	2460
gcggcaaaaa tggcggaaaa aagaatggtc cgacgagcag tatgaagcat ttattcagga	2520
agaaacaaag aaatggattg atattcagga agatctcggg cttgacgttc tcgttcacgg	2580
agaattcgaa cggacagaca tggttgagta tttcggcgaa aagctcggag gattcgcctt	2640
tactaaatac gcctgggttc agtcatacgg ttcccgtgc gtccggccgc cggatcatcta	2700
cggagatgtc gagtttaaag agccgatgac ggtaaaagaa acggtttacg ccaaatcctt	2760
gacctcgaag aaagtcaagg gcatgctgac agggcctgtt accattttta actgggtcctt	2820
tgcccgctat gacctgccga gaaaagagat cgccttccaa atcgctgcg cctccgcaa	2880
agaggttgaa gcgcttgaaa aagcaggaat tcaaatcatt caggctgatg aacctgcctt	2940
gagagaaggc ctgccgtta aagaacggga ttgggacgag tatctcaa at gggctgcaga	3000
agcgttcaga ctgtccactt catctgtgga agatacgacg caaatccata cgcataatgtg	3060
ctacagcaac tttgaagata tcgtagacgc gatcgaagat cttgacgcag acgtcattac	3120
gatcgagcac agcagaagcc acggcggatt tcttgattat ctggaacagc acccttacct	3180
gaaagggctt ggtcttggtg tatatgat at tcacagccct cgcgtccctt ccagcgatga	3240
aatgctcacg atcatagaag acgcgctgaa agtctgcccc gctgatcgct tctgggtaaa	3300
ccctgactgc ggtttaaaaa cgagacagcc agaggaaacg atcgacgcgc ttaagaatat	3360
ggttgaaagca gccaaacaag caagaggcaa actggctcag actgtttaat ttcacaaaaa	3420
atccactaca aacgccgcct gttcacacgg gcggctcttt tcatggctcc agcccttttt	3480
aggccaaaag aaccgttata caaggatatgt ccgccccaaa aacattaaga cttttgattc	3540
attcgtacga tttccttccg tatccttttc ttttaacata tttgtagtag atgatggaag	3600
ggaaggaaaa tatgtagtga ttgacgatgg aatagcggtta gaacgaaaaa tcaagcgaaa	3660
aatatatcag gaagacattc actctcttca gctatacgta aaagatgtga atgccgccat	3720
tgatgagctg aggcaggaaa gttcttctat tttaaaagca caccaaactg atatcaacgg	3780
atggcgcgga caggcgcgcg aaatgtatga cgcgcttttg gacgatctcg accgggcgga	3840
atcgcgctg tatgacaagc tgaggaccat taaagagcag gcggacgaag aaattgaacg	3900
gcttcagctg aaagccgagg agctgatatg acgatccggc tgaacatcaa tgatctgcac	3960
gccctcgccc gccaatctcg ttattcccac cagcgaatca gcgatttaat acgccttttg	4020
aaccgtcatt ttcattggttc ttttctccag cgtgaaaaca gcaaggaaca tgcggcat	4078

<211> 42

<212> DNA

<213> Artificial Sequence

<220>

<223> Primer

<400> 44
aaaaaaccg agtttcacaa aaaatccact acaaacgccg cc

42

<210> 45

<211> 41

<212> DNA

<213> Artificial Sequence

<220>

<223> Primer

<400> 45
ttttttttaa gcttatgccg catgttcctt gctgttttca c

41

<210> 46

<211> 32

<212> DNA

<213> Artificial Sequence

<220>

<223> Primer

<400> 46
aaaaaaatcg attcagggat ataaacgatc cg

32

<210> 47

<211> 45

<212> DNA

<213> Artificial Sequence

<220>

<223> Primer

<400> 47

tttttttttt ccatcgact gggatatcag ctcttcataa gcatc

45

<210> 48

<211> 3952

<212> DNA

<213> Artificial Sequence

<220>

<223> Primer

<400> 48

tttatacgtt tccctctcgg caatcggagc ctacacgaca ccaagctacg agctgagcct	60
ggcgaataaa atggtgaagc tgtttatgct gatatttggtg gcgcttttta aagtggagggg	120
atttgtcatc ggattaacga tcttaactat agtgatgact tcgatcaggt cattgcgaac	180
gccttactta tggcctctcc tcccgttcaa tggaaaagcg ttttggtatg ttctcgtgcg	240
cacgtccgtt ccagggggaa aagtcaggcc gagcatcgtt catccgagaa accgctccag	300
acagccgtga agccggcatt cgaagaggct tttccccggg gaaaagcctc tttttcaata	360
atcgaattcc ggtcttttag taccgatgcc tttgtattca ttggcagaga tcgcgactgc	420
ccggaggctg cagatgttgt tctgtcttct gatcggatag acgacataca gcatttcgcg	480
gccgtacggg tcaatcgttg acgaatgaag gaaaacctca gttcctctcc gccaaaatct	540
cgtattcgcc ggagctgtaa taatctgccc ttcataaggc tcataaattc tctgttcata	600
atgcgagcc ggctgataag gggcgtatac atcttcaggt gcatagccgg gagcgggggt	660
gtagggataa cgatttggat acatatgata acctctttcc cacttcgttt tttggttttc	720
atctttaaga ttatattcag gtaaatgcct atttgatgg gcgaaaatct cagcttttcg	780
gctctttttt tattgaatgg acgttgtgta tgcctatttc tatcaagcgc tgttttctgt	840
tattctataa tcaatagaat ggattagttg tttagggaaat catttccttt ataaatcaag	900
aaaatttgga caaatggtgg tttagttttt aaaacgaaat gttataatac aacataagaa	960
tcgcactatc atgaagccgg aagatgcacg gggcagcaac cggagcgcgc cagcaccctt	1020
tgtcgataga gaaagagggg atgacaattg tttttacacg gtactagcag acaaaatgaa	1080
agagggcacc tcgaaatcgg cgggtgctgat gttctatcat tggcagaaaag atacggaaca	1140
cctctttatg tatacgatgt cgcgctgatt agagagcgcg cccgaaaatt ccagaaggca	1200
ttcaagggaag ccggttttaa agcgcaggta gcgtatgcaa gcaaggcgtt ttcacggtt	1260
gccatgattc agcttgccga acaagagggg ctgtctctgg atgtggatc gggaggagag	1320

cttttcactg	cgatcaaagc	aggggtccca	gctgagcgga	ttcattttca	cggaacaat	1380
aagagccctg	aagaactagc	catggcgctg	gagcatcaaa	tcggctgcat	cgtgctcgat	1440
aactttcacg	agatcgccat	tacagaagat	ctttgcaagc	gatcaggaca	actgtagac	1500
gttttgctca	gaatcactcc	gggagttgaa	gcgcacacgc	acgattatat	tacgacgggg	1560
caggaagatt	ccaaattcgg	ttttgatctg	cataatggac	aggtcgaaca	agccatcgaa	1620
caagtccgcc	gctcgtctgc	gtttaagctc	ctcggcgctg	actgccacat	cggttcgcaa	1680
atTTTTgata	cggcaggatt	tgtccttgca	gcagacaaga	ttttcgagaa	gcttgcgga	1740
tggcgggaga	cttactcttt	cattccggaa	gtgctcaatc	ttggcggggg	cttcggcatc	1800
cgctatacaa	aagacgacga	gccgcttgca	gctgatgttt	atgttgaaaa	aatcatcgag	1860
gcggtcaaag	caaatgccga	gcatttcggc	tttgacatcc	ctgagatttg	gatcgaacca	1920
ggccggtctc	tcgtcgggtga	tgccgggact	acgctgtaca	cgatcggttc	tcaaaaagag	1980
gtgccgggca	ttcgcaaata	tgtagccatc	gacggcggca	tgagcgataa	tatcaggccg	2040
gcgctttatg	aggcaaaata	tgaagcagcc	gtcgccaaca	ggatgaacga	tgcttgctcat	2100
gataccgcat	caatcgcagg	aaaatgctgc	gaaagcggag	atatgctgat	ttgggatttg	2160
gaaatccccg	aagttcgcga	cggagatgtg	ctcgccgttt	tctgcaccgg	tgcgtagcgc	2220
tacagcatgg	ccaacaacta	caaccgcatt	ccgcgcccgg	ccgtcgtctt	tgtagaggac	2280
ggggaagcgc	agctcgtcat	tcagagagag	acgtatgagg	atatcgtaa	gctggatctg	2340
ccgctgaaat	cgaaagtcaa	acaataaaaa	aatggagatt	ccctaagagg	ggggtctcca	2400
tttttaattc	aagcacgaaa	aacacttccc	ggtgatcggg	aggtgttttt	tgtaaaaaag	2460
atcatgacat	gcatagaaca	gcgaccgggc	tagttgtata	taatattgtg	aatttaacaa	2520
aaaatttaca	aaggagatga	taaaggcaat	gaccagggtg	aaaaggatga	gatttgctga	2580
tttgttggat	ttagaggcgg	agtagatgaa	accggccaaa	gtatccctac	tccaccgatt	2640
gctccagtgc	ctgaagcaat	gtgttgattg	taacacagta	aatcgtttta	cagcaataaa	2700
catttttgtg	aatattttat	tgattttggc	tgtgatctca	ttcccatatt	ctgctgcggc	2760
ccatggcgca	acacagtccg	gcgatcaata	ttcaagcttt	gaagaattgg	agcggaatga	2820
agatccagct	tcttaccgaa	ttacggagaa	gaacgcaaga	gtgccgatgc	tcatcatggc	2880
catccatgga	ggcggcatcg	aaccgggaac	gagcgaaatc	gccaatgaag	tgtccaaaaa	2940
ctattccctg	tacttgtttg	aagggtgaa	atcatcaggc	aatacggacc	ttcacattac	3000
aagcacgcgt	tttgacgagc	cagcggcgct	cgcaattact	gcaagccacc	agtatgtcat	3060
gtcgctccac	ggctattaca	gtgaagaccg	cgatattaaa	gtaggcggca	agaccgcgc	3120
taaaatcaga	atattggttg	atgagctgaa	ccgctcgggg	tttgccgctg	aaatgctggg	3180
gacagatgac	aagtatgccg	gaacccatcc	gaataacatc	gccaacaagt	cgctttccgg	3240

gctgagcatt cagcttgaaa tgagcacggg tttccgcaaa tctttattcg accggtttac	3300
actaaaagac agggcggcga cgcaaaacga aacgttttac cgatttaca agctgctgac	3360
agattttatt catgaaaact atgaagaaga cggaggggat ttcccctctg caaaaataaa	3420
acacccctt caagtgaaaa aaggaggtgt ttcggcggtt gtgttaaccg ttggactctg	3480
aggtgccgcc gccggtgaat acggaaacga tggcgttcca cagagacaca aagaagtcga	3540
tcagtttttg aagaaagttt tgccttctt cagaatcaa gaatttcgtg attttatcct	3600
ttgctttgtc aagctggtct ccaacctggg tccagtcgat attaataattt ttcattgtat	3660
taaataaaga tataagagag tttttctgat cttctgtgag tgtcacgcca agttcggag	3720
cagccgaatc aatcgttttc tccaattcct cttttgactc gggaaactccg tttttcgaga	3780
tttcttctt gactttggcc atcagcgctg acgcgttttc actgccgatt ttctcgccaa	3840
gctctgaagt ggtgacaagc tcttcattcg cgacctttt cacatcttcg gaaatttttt	3900
cgcccgaagt cgtttcatac gctttcatca atccggttaa agcggctgtg cc	3952

<210> 49

<211> 6837

<212> DNA

<213> Artificial Sequence

<220>

<223> Plasmid pMOL 1642

<220>

<221> misc_feature

<222> (669)..(669)

<223> an undetermined nucleotide

<400> 49

gatcttcctt caggttatga ccatctgtgc cagttcgtaa tgtctggtca actttccgac	60
tctgagaaac ttctggaatc gctagagaat ttctggaatg ggattcagga gtggacagaa	120
cgacacggat atatagtgga tgtgtcaaaa cgcataccat tttgaacgat gacctcta	180
aattgttaat catgtttggag ctgagtgaga gcgaagcgaa cacttgattt tttaattttc	240
tatcttttat aggtcattag agtatactta tttgtcctat aaactattta gcagcataat	300
agatttattg aataggtcat ttaagttgag catattagag gaggaaaatc ttggagaaat	360
atttgaagaa cccgaggatc catgctgtcc agactgtccg ctgtgtaaaa aataggaata	420

aagggggggtt gttattat	tactgat	tataa	ttgtata	aaaatgagag	480
ggagaggaaa catgaaga	attgcaattg	cggcgattac	agcgacaagc	gtgctggctc	540
tcagcgc	cagcggggga	gattctgagg	ttgttg	aacaaaagct	600
caaaagaaga ctttat	ca	acattaaaag	acaatgccg	agcggacgca	660
ctgaacatgc					
ttgttcagna aaaagt	actc	gatgataaat	acgatgtctc	cgacaaagaa	720
atcgacaaaa					
agctgaacga gtacaaaa		tcaatgggtg	accagctcaa	ccagctcatt	780
gaccaaaaag					
gcgaagactt cgtcaa	agaa	cagatcaa	at	acgaacttct	840
gatgcaaaaa		gccgcaaagg			
ataacataaa agtaacc	gat	gatgacgtaa	aagaatatta	tgacggcctg	900
aaaggcaaaa					
tccacttaag ccacatt	ctt	gtgaaagaaa	agaaaacggc	tgaagaagtt	960
gagaaaaagc					
tgaaaaaagg cgaaaa	attc	gaagaccttg	caaaagagta	ttcgggtacc	1020
gggtctagag					
tcgacgcggc cgcaacc	att	tgatcaaagc	ttgcatgcct	gcaggctgat	1080
tcacaaaaaa					
taggcacacg aaaaaca	agt	taagggatgc	agtttatgca	tcccttaact	1140
tacttattaa					
ataatttata gctattg	aaa	agagataaga	attgttcaaa	gctaataattg	1200
tttaaactgt					
caattcctgc atgtttt	aag	gaattgttaa	attgattttt	tgtaaataatt	1260
ttcttgtatt					
ctttgttaac ccatttc	ata	acgaaataat	tatacttttg	tttatctttg	1320
tgtgatattc					
ttgatttttt tctactt	aat	ctgataagtg	agctattcac	tttaggttta	1380
ggatgaaaat					
attctcttgg aaccata	ctt	aatatagaaa	tatcaacttc	tgccattaaa	1440
agtaatgcca					
atgagcgttt tgtattt	aat	aatcttttag	caaaccgta	ttccacgatt	1500
aaataaatct					
cattagctat actatca	aaa	acaattttgc	gtattatata	cgtacttatg	1560
ttataaggta					
tattaccata tattttat	ag	gattggtttt	taggaaattt	aaactgcaat	1620
atatccttgt					
ttaaaacttg gaaattat	cg	tgatcaacaa	gtttattttc	tgtagttttg	1680
cataatttat					
gggtctatttc aatggc	agt	acgaaattac	acctctttac	taattcaagg	1740
gtaaaatggc					
cttttcctga gccgatt	tca	aagatattat	catgttcatt	taatcttata	1800
tttgtcatta					
ttttatctat attatgt	ttt	gaagtaataa	agttttgact	gtgttttata	1860
tttttctcgt					
tcattataac cctcttt	aat	ttggttatat	gaattttgct	tattaacgat	1920
tcattataac					
cacttatttt ttgtttg	gtt	gataatgaac	tgtgctgatt	acaaaaatac	1980
taaaaatgcc					
catatttttt cctcctt	ata	aaattagtat	aattatagca	cgagctctga	2040
taaatatgaa					
catgatgagt gatcgtt	aaa	tttatactgc	aatcggatgc	gattattgaa	2100
taaaagatat					
gagagattta tctaatt	tct	tttttcttgt	aaaaaaagaa	agttcttaaa	2160
ggttttatag					
ttttggtcgt agagcac	acg	gtttaacgac	ttaattacga	agtaaataag	2220
tctagtgtgt					
tagactttat gaaatct	ata	tacgtttata	tatattttatt	atccggaggt	2280
gtagcatgtc					
tcattcaatt ttgaggg	ttg	ccagagttaa	aggatcaagt	aatacaaacg	2340
ggatacaaag					

acataatcaa	agagagaata	aaaactataa	taataaagac	ataaatcatg	aggaaacata	2400
taaaaattat	gatttgatta	acgcacaaaa	tataaagtat	aaagataaaa	ttgatgaaac	2460
gattgatgag	aattattcag	ggaaacgtaa	aattcgggtca	gatgcaattc	gacatgtgga	2520
cggactgggt	acaagtgata	aagatttctt	tgatgattta	agcggagaag	aaatagaacg	2580
attttttaaa	gatagcttgg	agtttctaga	aaatgaatac	ggtaaggaaa	atatgctgta	2640
tgcgactgtc	catctggatg	aaagagtccc	acatatgcac	tttggttttg	tccctttaac	2700
agaggacggg	agattgtctg	caaaagaaca	gttaggcaac	aagaaagact	ttactcaatt	2760
acaagataga	tttaatgagt	atgtgaatga	gaaagggttat	gaacttgaaa	gaggcacgtc	2820
caaagagggt	acagaacgag	aacataaagc	gatggatcag	tacaagaaag	atactgtatt	2880
tcataaacag	gaactgcaag	aagttaagga	tgagttacag	aaggcaaata	agcagttaca	2940
gagtggaata	gagcatatga	ggctctacga	accctttgat	tatgaaaatg	agcgtacagg	3000
tttgttctct	ggacgtgaag	agactggtag	aaagatatta	actgctgatg	aatttgaacg	3060
cctgcaagaa	acaatctctt	ctgcagaacg	gattgttgat	gattacgaaa	atattaagag	3120
cacagactat	tacacagaaa	atcaagaatt	aaaaaacgt	agagagagtt	tgaaagaagt	3180
agtgaataca	tggaaagagg	ggatcacga	aaaaagtaaa	gagggttaata	aattaaagcg	3240
agagaatgat	agtttgaatg	agcagttgaa	tgtatcagag	aaatttcaag	ctagtacagt	3300
gactttatat	cgtgctgcga	gggcgaattt	ccctgggttt	gagaaaggg	ttaataggct	3360
taaagagaaa	ttctttaatg	attccaaatt	tgagcgtgtg	ggacagttta	tggatgttgt	3420
acaggataat	gtccagaagg	tcgatagaaa	gcgtgagaaa	cagcgtacag	acgatttaga	3480
gatgtagagg	tacttttatg	ccgagaaaac	tttttgctg	tgacagtcct	taaaatatac	3540
ttagagcgta	agcgaaagta	gtagcgacag	ctattaactt	tcggtttcaa	agctctagga	3600
tttttaatgg	acgcagcgca	tcacacgcaa	aaaggaaatt	ggaataaatg	cgaaatttga	3660
gatgttaatt	aaagaccttt	ttgagggtctt	tttttcttag	atttttgggg	ttatttaggg	3720
gagaaaacat	aggggggtac	tacgacctcc	cccctagggtg	tccattgtcc	attgtccaaa	3780
caaataaata	aatattgggt	ttttaatggt	aaaagggtgt	tttttatgtt	aaagtgaaaa	3840
aaacagatgt	tgggaggtac	agtgatgggt	gtagatagaa	aagaagagaa	aaaagttgct	3900
gttactttta	gacttacaac	agaagaaaat	gagatattaa	atagaatcaa	agaaaaatat	3960
aatattagca	aatcagatgc	aaccgggtatt	ctaataaaaa	aatatgcaaa	ggaggaatac	4020
gggtgcatttt	aaacaaaaaa	agatagacag	cactggcatg	ctgcctatct	atgactaaat	4080
tttgtttaagt	gtattagcac	cgttattata	tcatgagcga	aaatgtaata	aaagaaactg	4140
aaaacaagaa	aaattcaaga	ggacgtaatt	ggacatttgt	tttatatcca	gaatcagcaa	4200
aagccgagtg	gtagagtagt	ttaaaagagt	tacacattca	atttgtagtg	tctccattac	4260

atgatagggg	tactgataca	gaaggtagga	tgaaaaaaga	gcattatcat	attctagtga	4320
tgtatgaggg	taataaatct	tatgaacaga	taaaaataat	tacagaagaa	ttgaatgcga	4380
ctattccgca	gattgcagga	agtgtgaaag	gtcttgtag	atatatgctt	cacatggacg	4440
atcctaataa	atttaaatat	caaaaagaag	atatgatagt	ttatggcggg	gtagatgttg	4500
atgaattatt	aaagaaaaca	acaacagata	gatataaatt	aattaaagaa	atgattgagt	4560
ttattgatga	acaaggaatc	gtagaattta	agagtttaat	ggattatgca	atgaagttta	4620
aatttgatga	ttggttcccc	cttttatgtg	ataactcggc	gtatgttatt	caagaatata	4680
taaaatcaaa	tcggtataaa	tctgaccgat	agattttgaa	tttaggtgtc	acaagacact	4740
cttttttcgc	accagcgaaa	actggtttaa	gccgactgcg	caaaagacat	aatcgactct	4800
agaggatcct	tttagtccag	ctgatttcac	tttttgcatt	ctacaaactg	cataactcat	4860
atgtaaatcg	ctccttttta	gggtggcaca	atgtgaggca	ttttcgctct	ttccggcaac	4920
cacttccaag	taaagtataa	cacactatac	tttatattca	taaagtgtgt	gctctgcgag	4980
gctgtcggca	gtgccgacca	aaaccataaa	acctttaaga	cctttctttt	ttttacgaga	5040
aaaaagaaac	aaaaaaacct	gccctctgcc	acctcagcaa	aggggggttt	gctctcgtg	5100
ctcgtttaaa	aatcagcaag	ggacaggtag	tattttttga	gaagatcact	caaaaaatct	5160
ccacctttaa	acccttgcca	atttttattt	tgtccgtttt	gtctagctta	ccgaaagcca	5220
gactcagcaa	gaataaaatt	tttattgtct	ttcggttttc	tagtgtaacg	gacaaaacca	5280
ctcaaaataa	aaaagataca	agagagggtct	ctcgtatctt	ttattcagca	atcgcgcccc	5340
attgctgaac	agattaataa	tgagccgcgg	atatcgatgc	cttgtcagag	agattcctga	5400
agagcggcag	gataaggtat	ttagaatgat	taatgtgctg	atcttaattt	tattgatctc	5460
atcattcatt	gagattttct	ttacggtgta	aagaaaaagg	atagctgccg	atcgtattga	5520
tccggcagct	atccttttgt	ttattagcat	atccaagaag	caccaataat	aattaataag	5580
atgaacagca	ccacaagcag	cgcaaagccg	ccagcgaaac	ctcctgcata	accgtcgcgc	5640
atattgacac	ctcctctgcc	ccagtcgtta	cattagtgtg	tgcacgaatg	tcatgaaacg	5700
attaggctat	cgtccaaaag	aaaagaaccg	cctgaaaaaa	tgacggttct	tttctcattt	5760
tctaaggttt	tagtacagat	aagctgcacc	aacgatgatt	aataaaatga	acaacacgac	5820
caataaagca	aaaccgcttg	agtatcctcc	gctcatgtta	ttgacctcga	attctgatca	5880
aatggttcag	tgagagcgaa	gcgaacactt	gattttttta	ttttctatct	tttataggtc	5940
attagagtat	acttatttgt	cctataaact	atthagcagc	ataatagatt	tattgaatag	6000
gtcatttaag	ttgagcatat	tagaggagga	aatccttgga	gaaatatttg	aagaaccgca	6060
acgcgtgagt	agttcaacaa	acgggccagt	ttgttgaaga	ttagatgcta	taattgttat	6120
taaaaggatt	gaaggatgct	taggaagacg	agttattaat	agctgaataa	gaacggtgct	6180

ctccaaatat tcttatttag aaaagcaaat ctaaaattat ctgaaaaggg aatgagaata	6240
gtgaatggac caataataat gactagagaa gaaagaatga agattgttca tgaaattaag	6300
gaacgaatat tggataaata tggggatgat gttaaggcta ttggtgttta tggctctctt	6360
ggtcgtcaga ctgatgggcc ctattcggat attgagatga tgtgtgtcat gtcaacagag	6420
gaagcagagt tcagccatga atggacaacc ggtgagtgga aggtggaagt gaattttgat	6480
agcgaagaga ttctactaga ttatgcatct cagggtggaat cagattggcc gcttacacat	6540
ggtcaatttt tctctatttt gccgatttat gattcagggtg gatacttaga gaaagtgtat	6600
caaactgcta aatcggtaga agcccaaacg ttccacgatg cgatttgtgc ctttatcgta	6660
gaagagctgt ttgaatatgc aggcaaatgg cgtaatatc gtgtgcaagg accgacaaca	6720
tttctaccat ctttgactgt acaggtagca atggcagggtg ccatgttgat tggctctgcat	6780
catcgcacat gttatacgac gagcgcttcg gtcttaactg aagcagttaa gcaatca	6837

<210> 50

<211> 817

<212> DNA

<213> Artificial Sequence

<220>

<223> Primer

<400> 50

gaattccggc ccaacgatgg ctgatttccg ggttgacggc cggcggaacc aaggggtgat	60
cggtcggcgg aaatgaaggc ctgcggcgag tgcgggcctt ctgttttgag gattataatc	120
agagtatatt gaaagtttcg cgatcttttc gtataattgt tttaggcata gtgcaatcga	180
taagcttgaa ttcggaggcc gttattatat catgagcgaa aatgtaataa aagaaactga	240
aaacaagaaa aattcaagag gacgtaattg gacatttggt ttatatccag gtcagcaaa	300
agccgagtgg ttagagtatt taaaagagtt acacattcaa tttgtagtgt ctccattaca	360
tgatagggat actgatacag aaggtaggat gaaaaaagag cattatcata ttctagtgat	420
gtatgagggg aataaatctt atgaacagat aaaaataatt acagaagaat tgaatgcgac	480
tattccgcag attgcaggaa gtgtgaaagg tcttgtagaga tatatgcttc acatggacga	540
tcctaataaa tttaaatatt aaaaagaaga tatgatagtt tatggcgggtg tagatgttga	600
tgaattatta aagaaaacaa caacagatag atataaatta attaaagaaa tgattgagtt	660
tattgatgaa caaggaatcg tagaatttaa gagtttaatg gattatgcaa tgaagtttaa	720
atttgatgat tggttccgcg ttttatgtga taactcggcg tatgttattc aagaatatat	780

aaaatcaaat cggtataaat ctgaccgata gggatcc

817